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Bithell et al.

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- (54) **CLIP FOR PIN RETENTION**
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See application file for complete search history.

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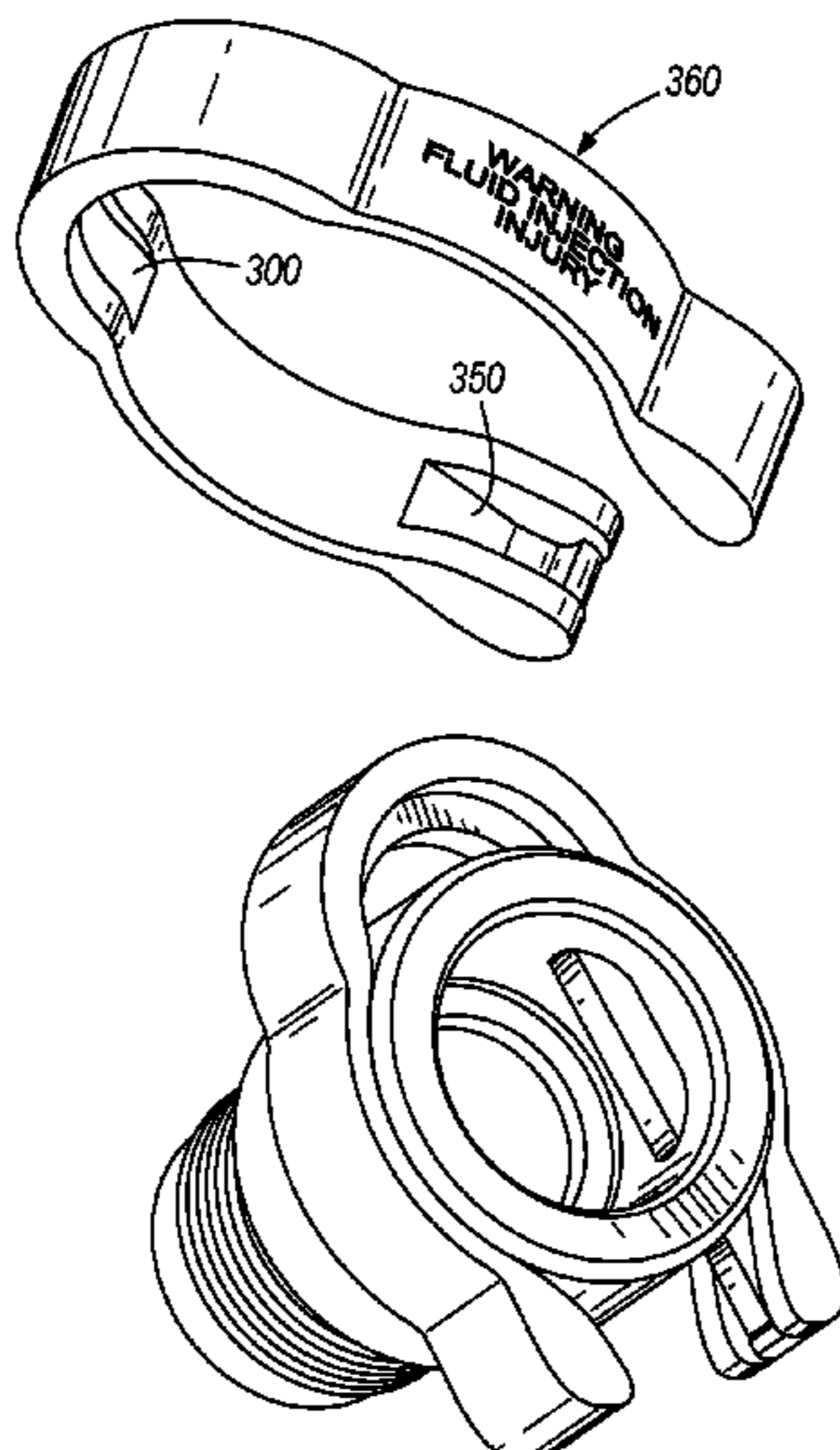
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(57) **ABSTRACT**

A clip for a pin that extends from an outer surface of a member, the clip comprising a pin retaining portion and a clamp portion that surrounds the member outer surface, the clamp portion having a pin receiving opening therein adapted to receive the exposed end of the pin, and a pin retaining portion adjacent the pin receiving opening to retain the pin in the member.

5 Claims, 7 Drawing Sheets



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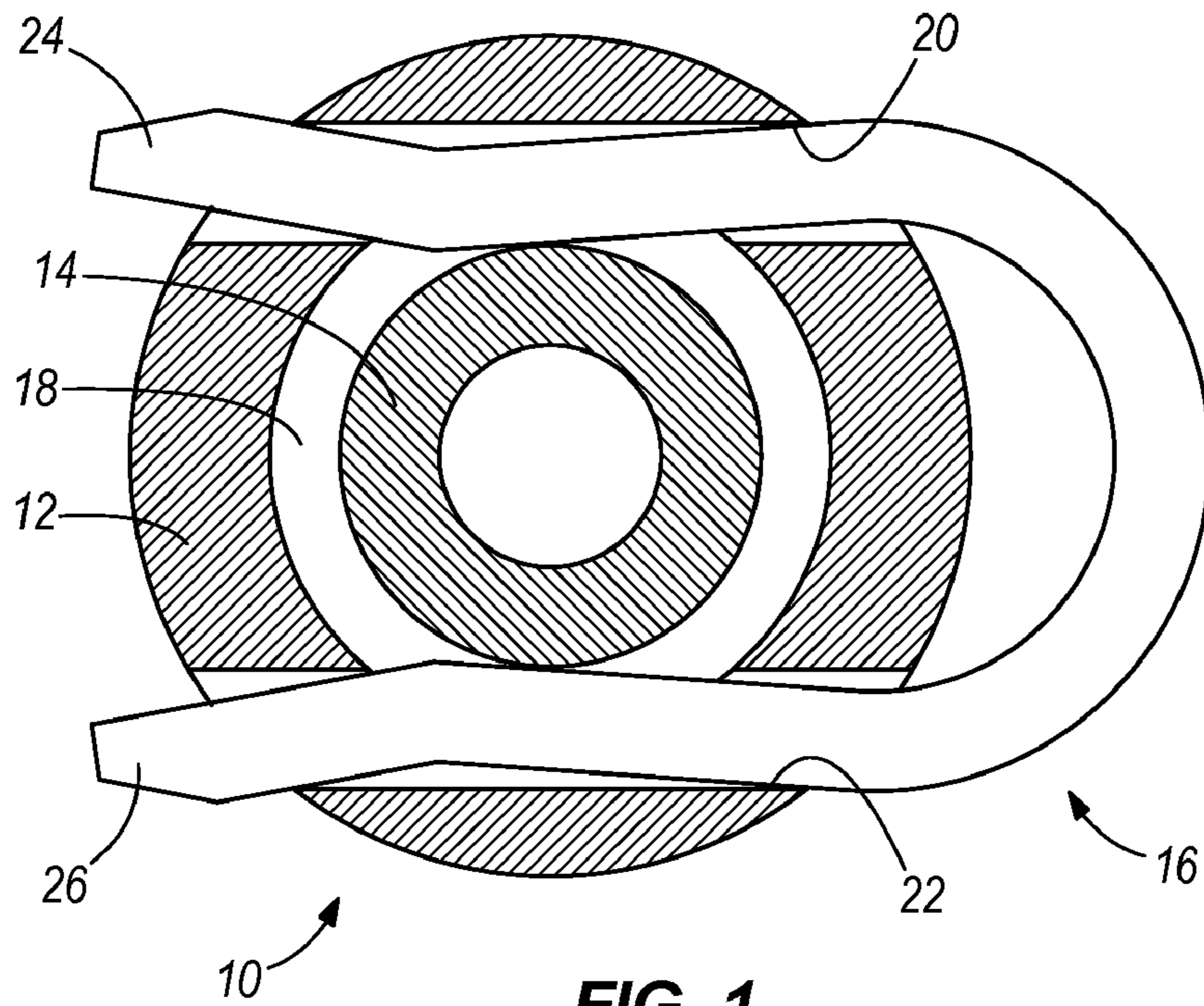


FIG. 1
PRIOR ART

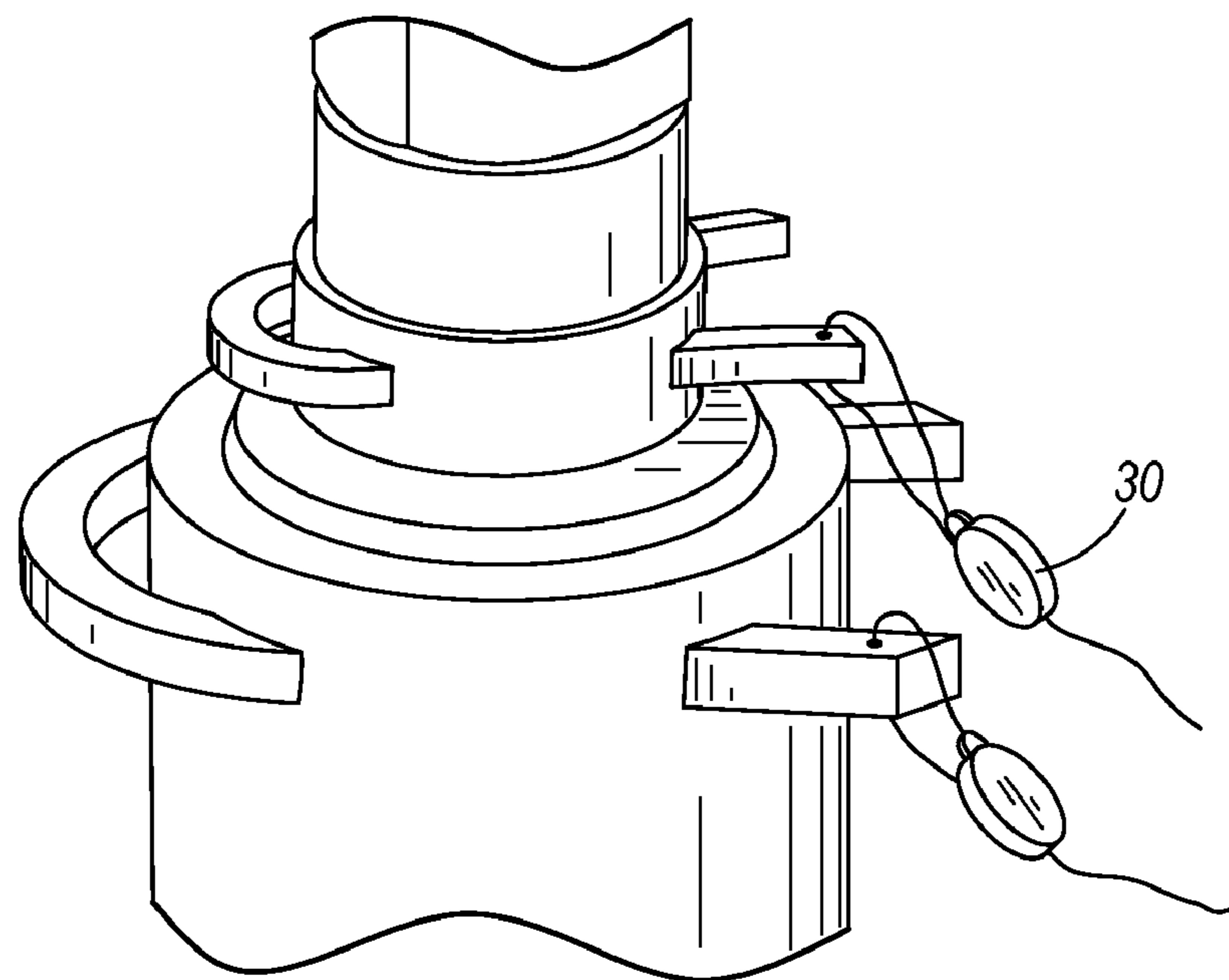
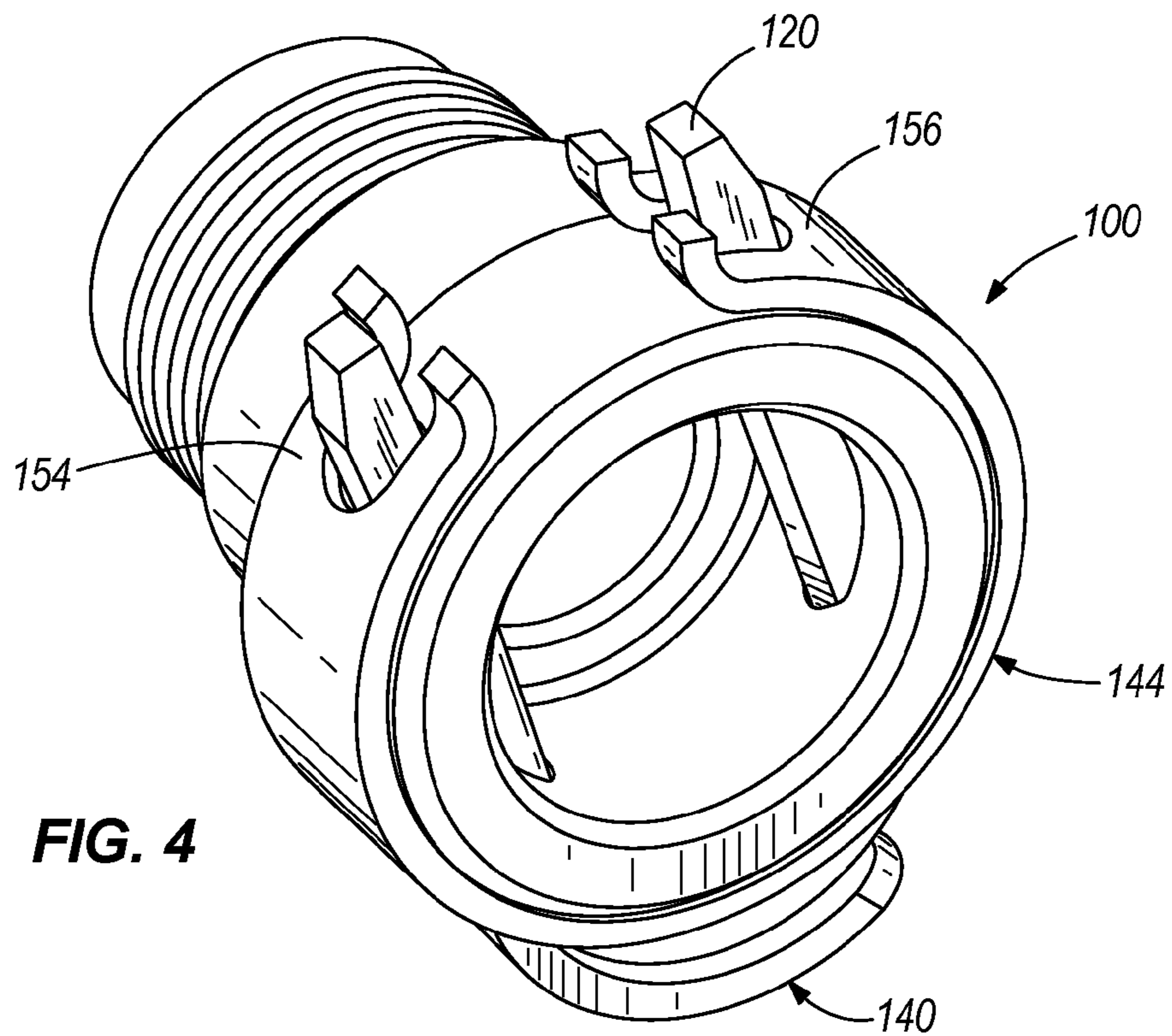
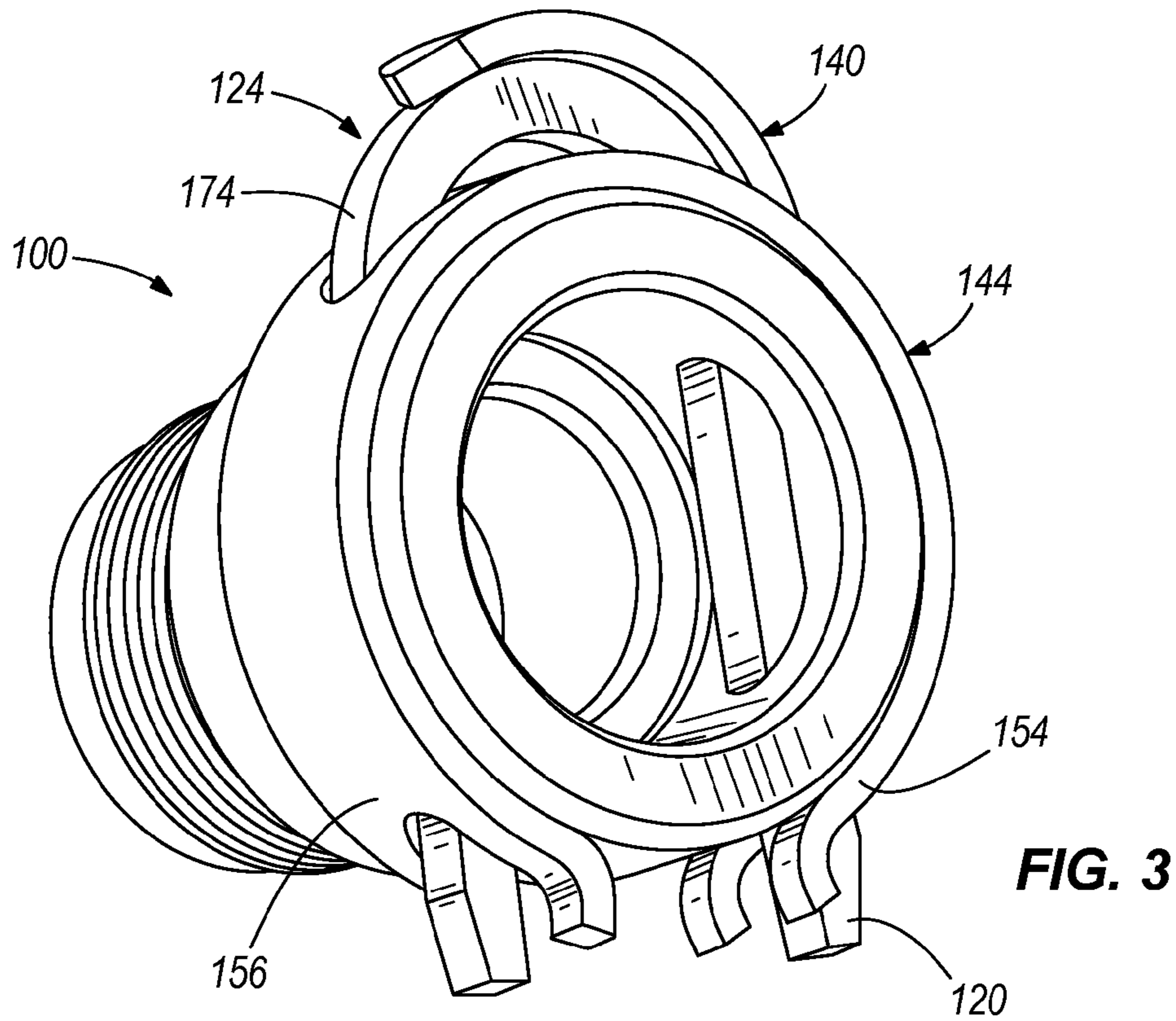
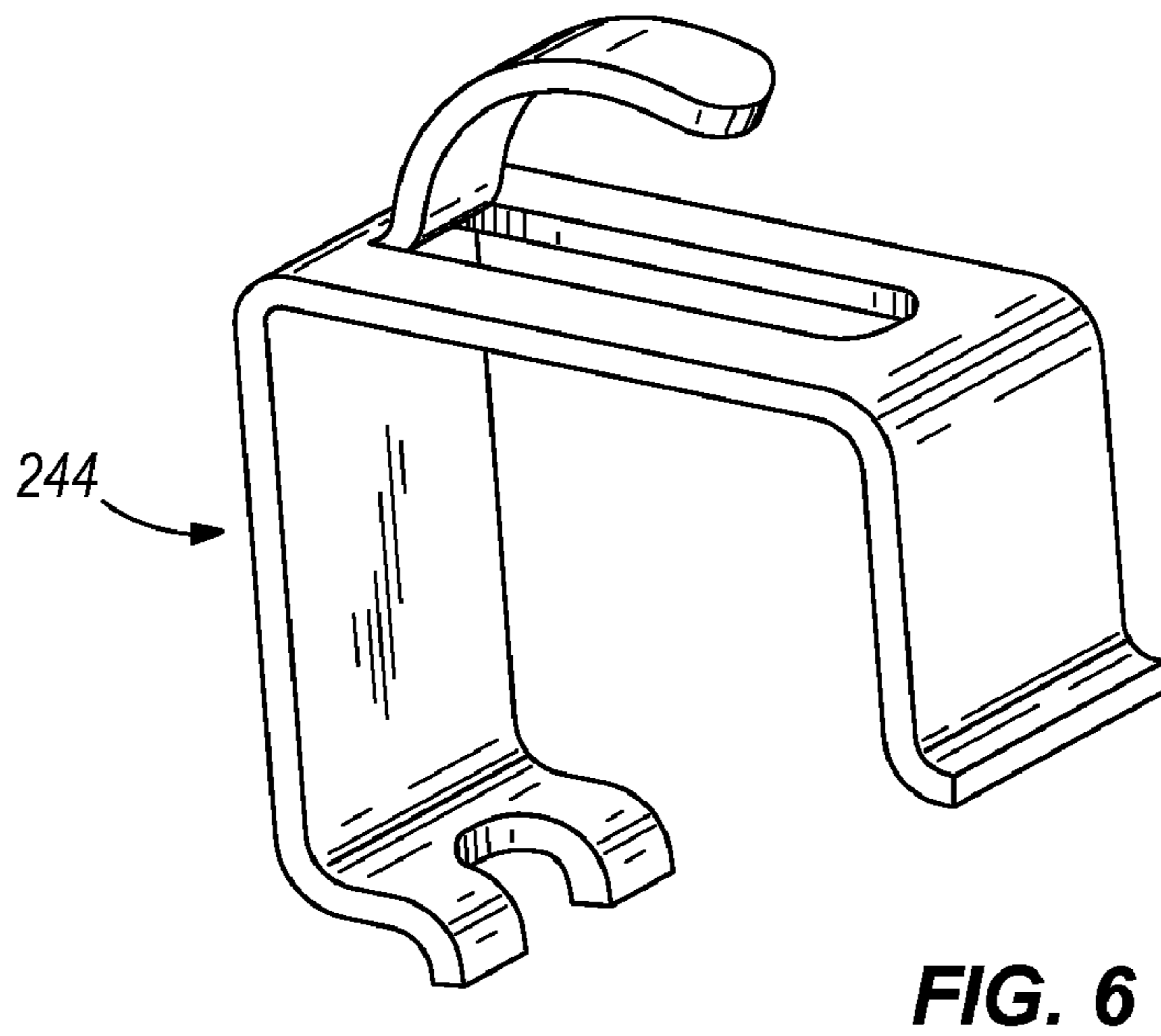
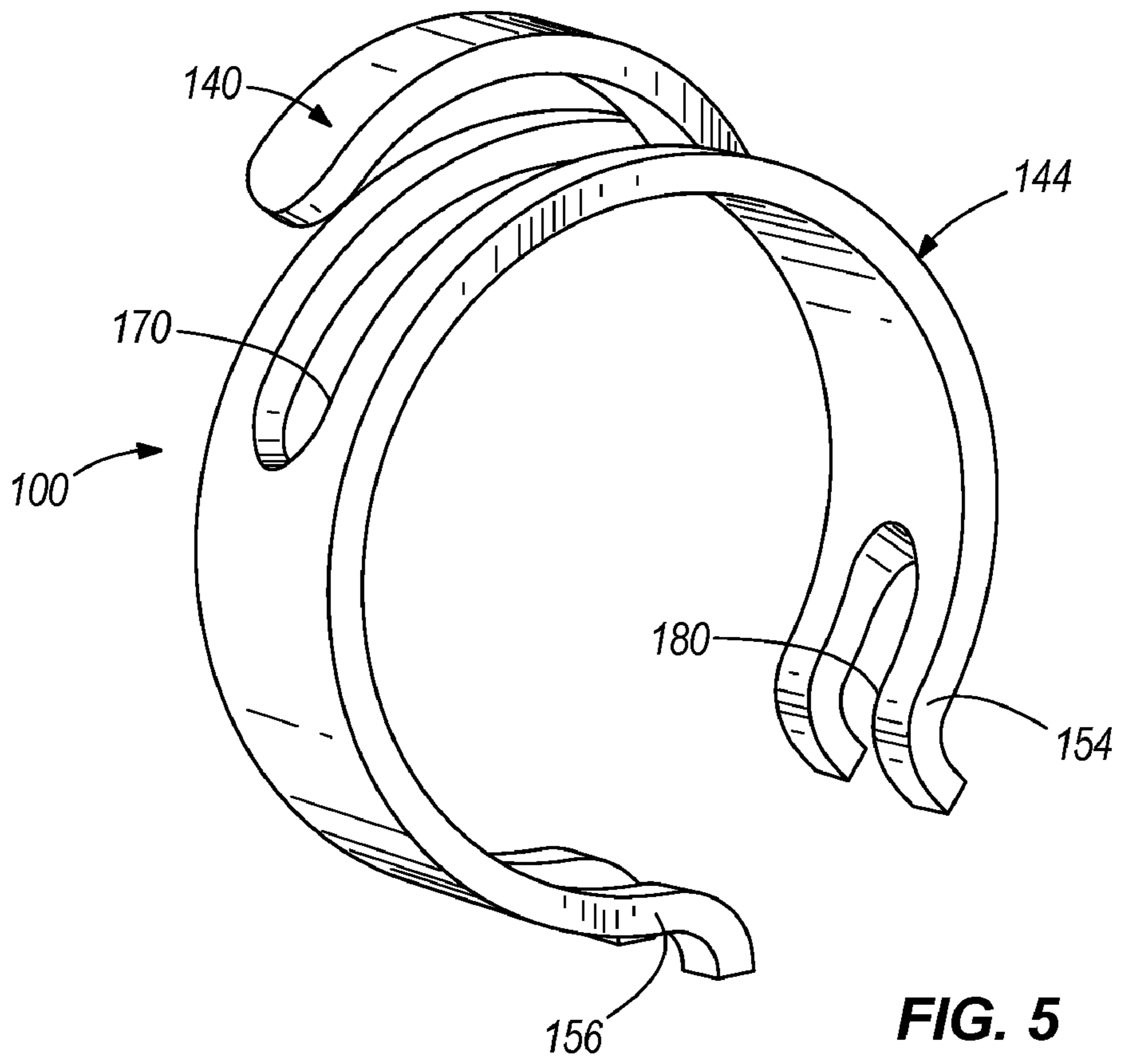
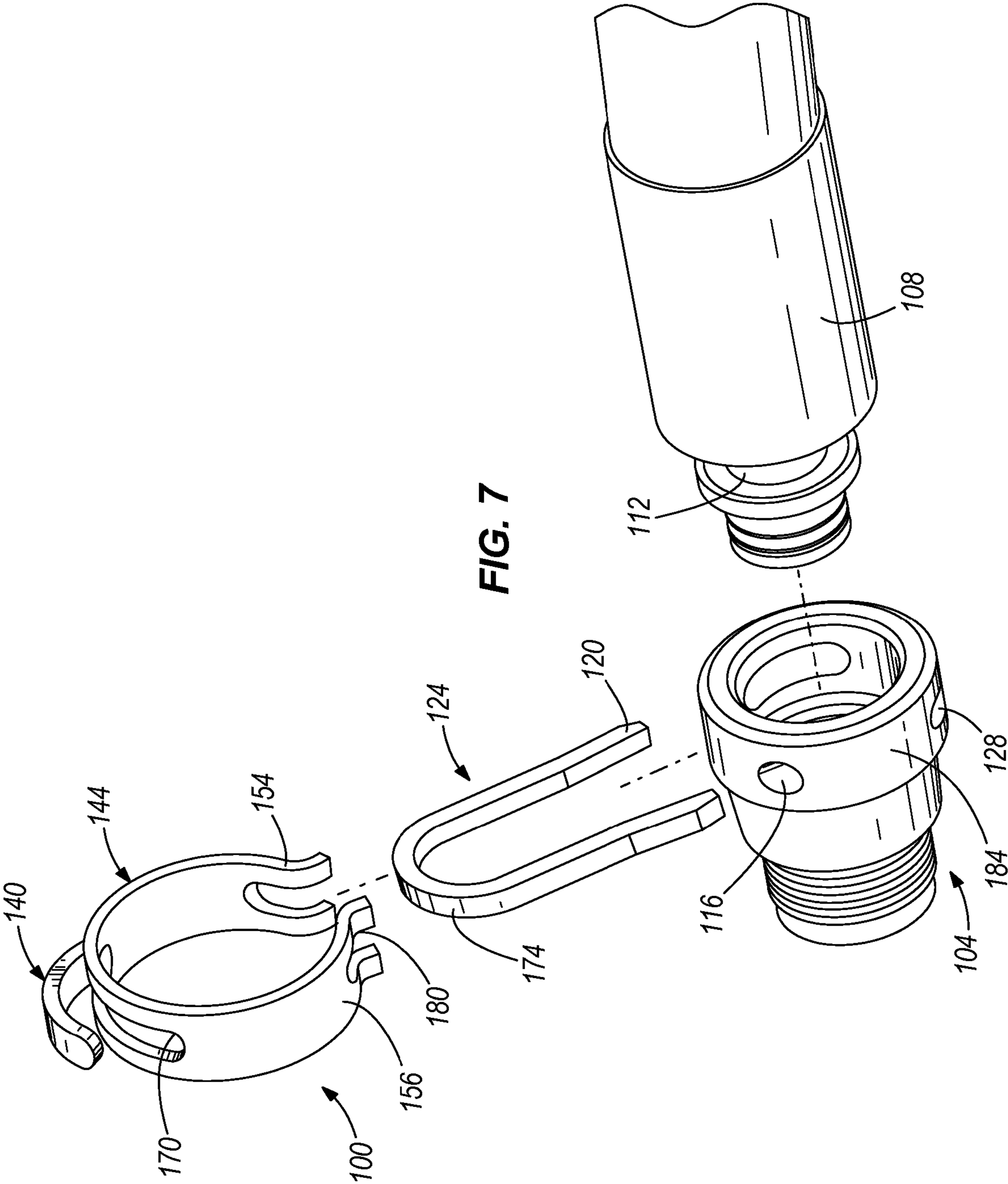


FIG. 2
PRIOR ART







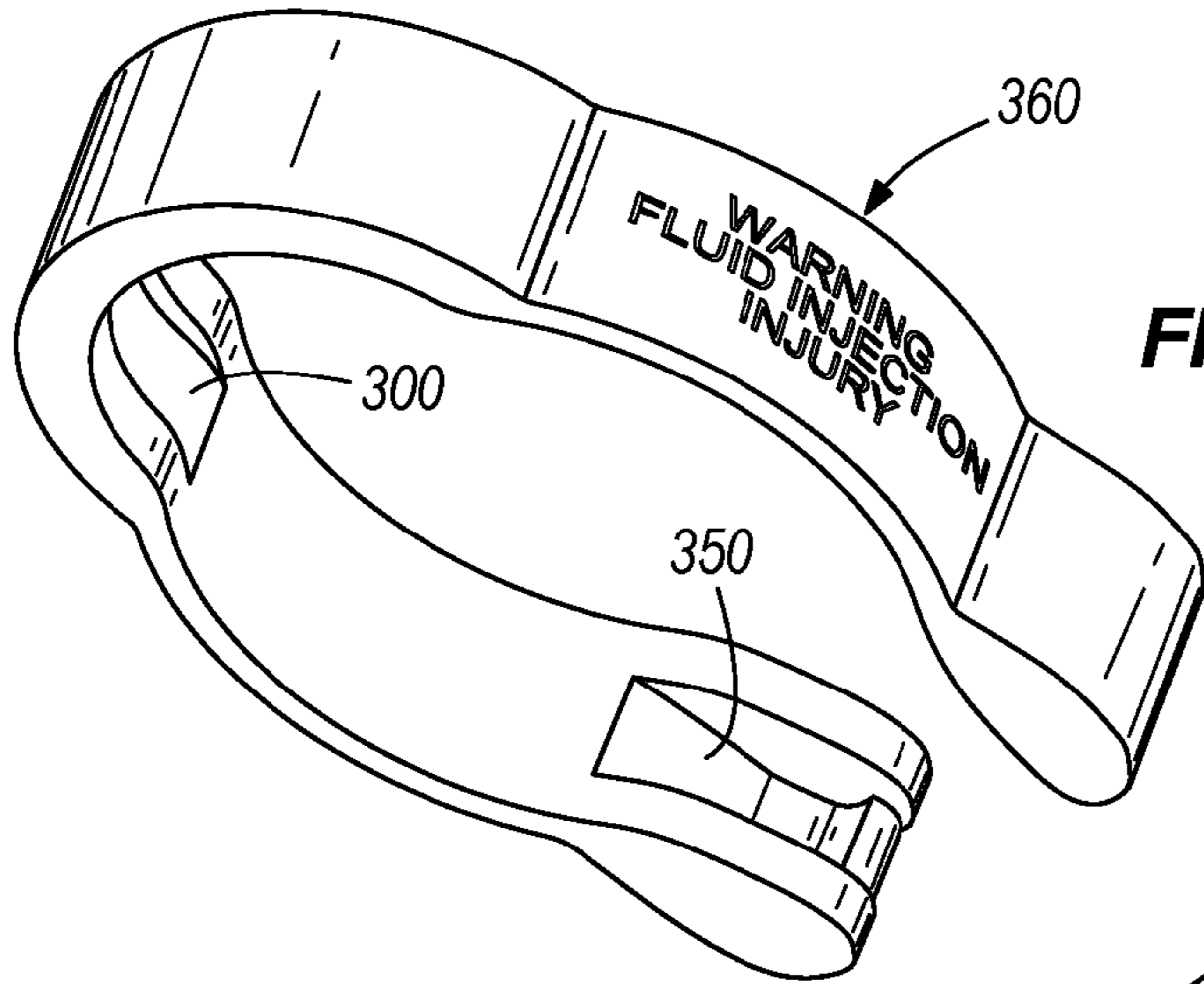


FIG. 8

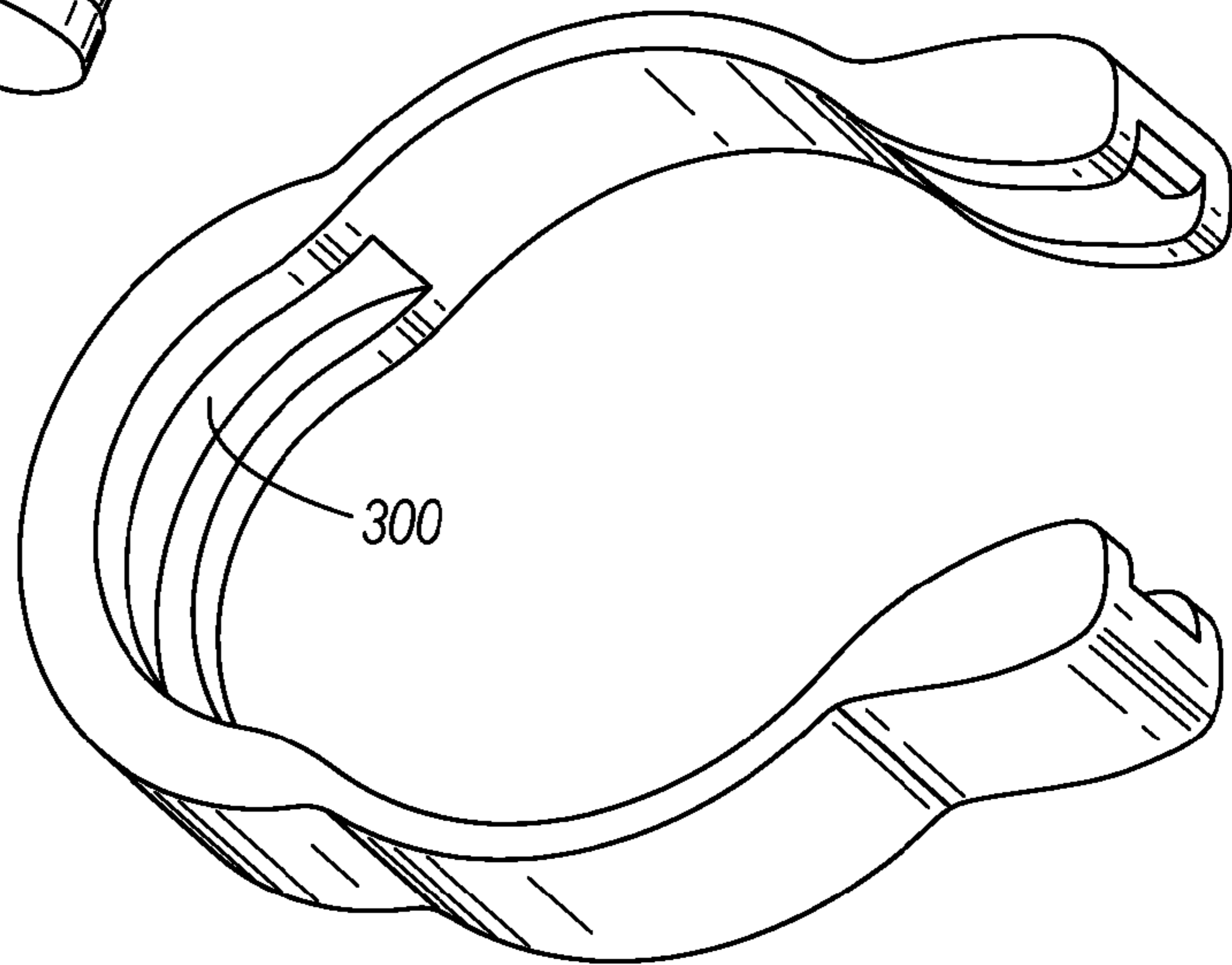


FIG. 9

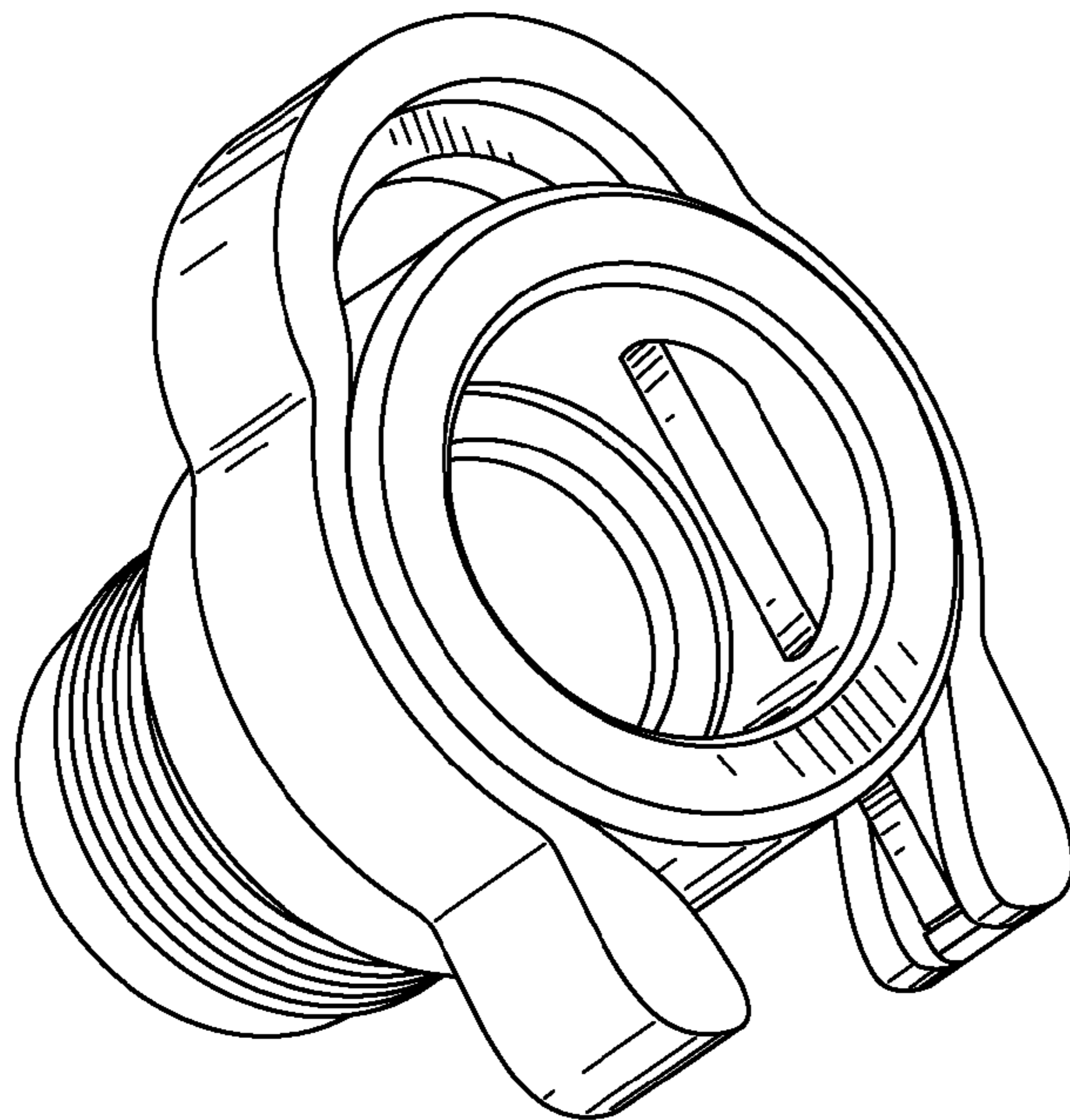


FIG. 10

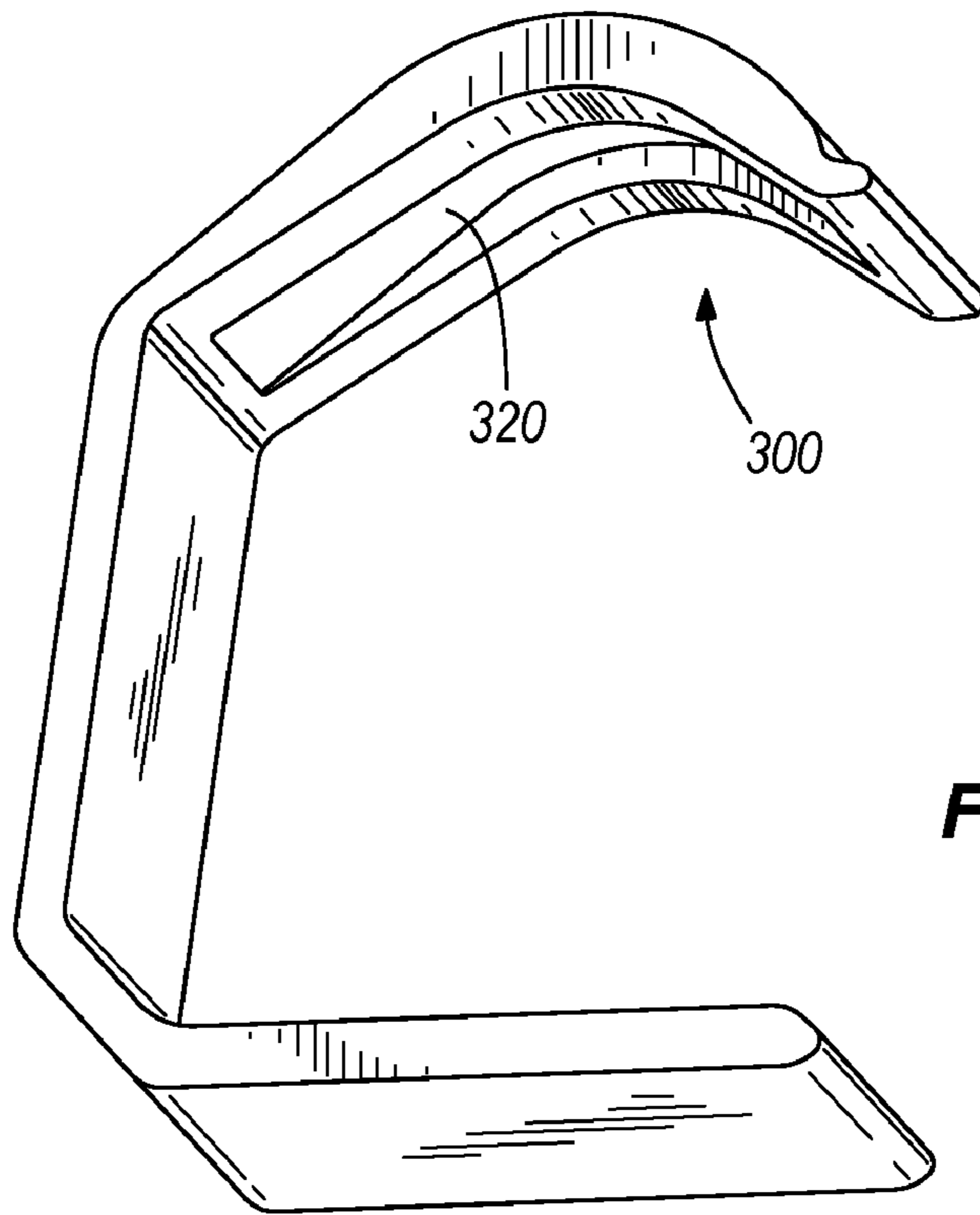


FIG. 11

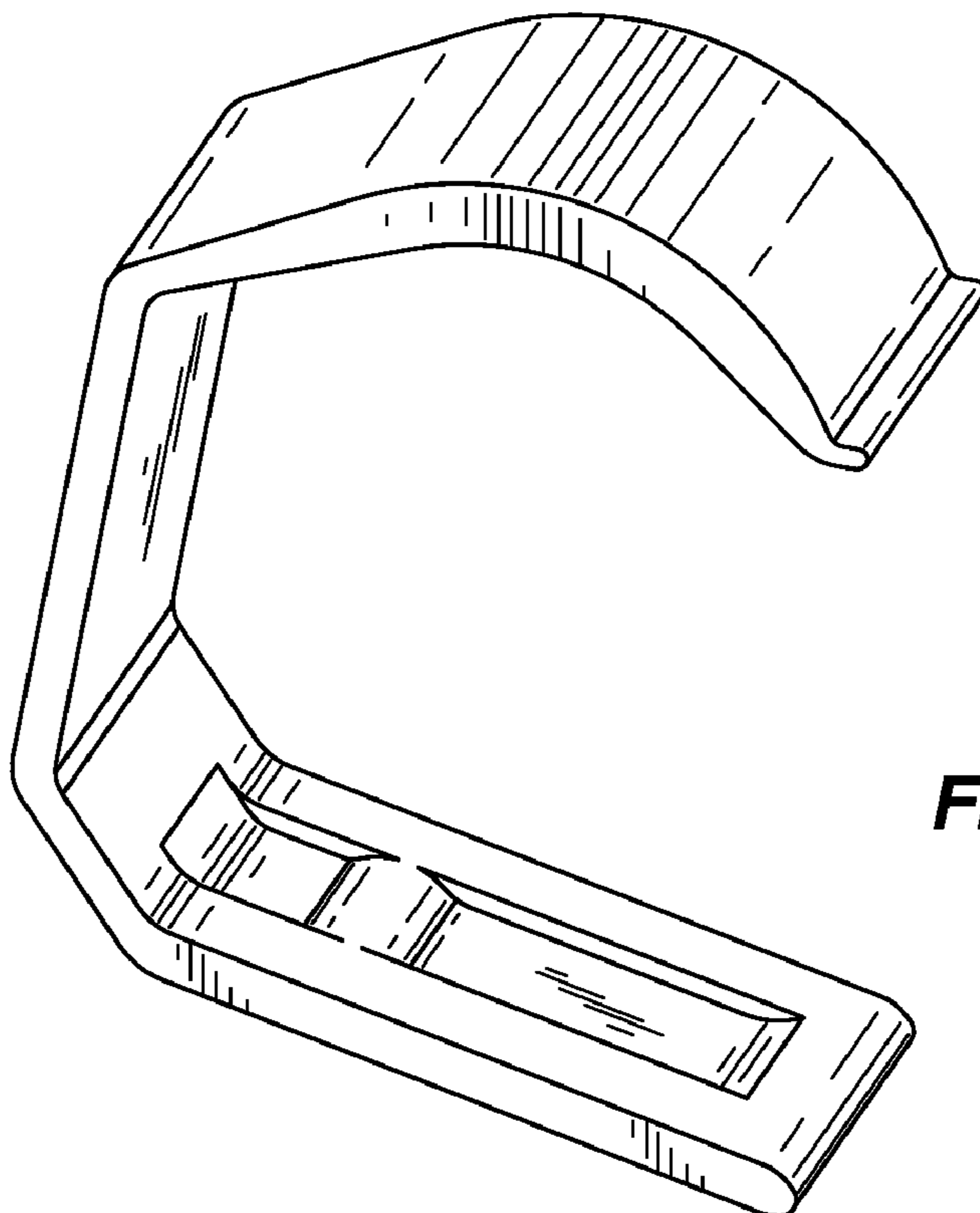


FIG. 12

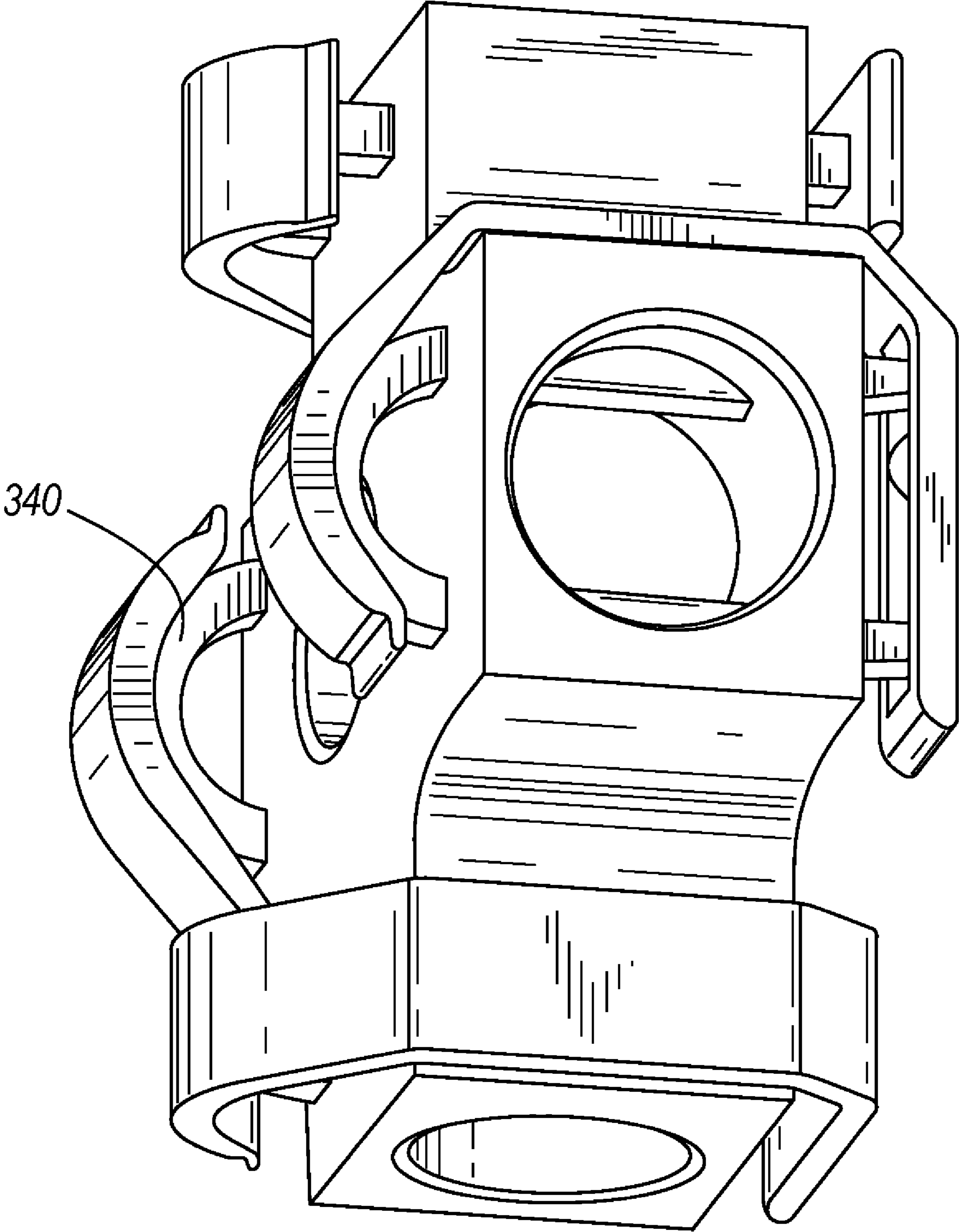


FIG. 13

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CLIP FOR PIN RETENTION

BACKGROUND

The present disclosure relates to clip retainers used to secure a pin in a member. More particularly, the disclosure relates to clip retainers used to secure a staple in a hydraulic hose connection.

In many hydraulic pieces of machinery, a large number of hose connections are required. One such piece of machinery is a longwall mining installation having a large number of hydraulic roof supports. The roof supports are powered by a number of hydraulic cylinders, controlled by a series of valves. High-pressure hydraulic fluid, at around 5,000 psi, is transported around the roof supports, between the valves and cylinders using numerous hoses.

The hoses typically have staple type connections, and these connections range in both length and bore size. A staple type hose connection 10, as shown in FIG. 1, includes a female sleeve piece 12, a male piece 14 of a size and configuration to permit insertion into the female sleeve piece 12, and a generally U-shaped staple 16.

The male piece has a groove 18, and, when the male piece is received within the female sleeve piece, the groove is aligned with two spaced apart openings 20 and 22 in the female sleeve piece 12. The openings receive the ends of the U-shaped staple 16. As illustrated in FIG. 1, the legs of the U-shaped staple 16 are received within the groove 18 of the male piece 14 and secured by the female sleeve piece 12, thus locking the male piece 14 within the female piece 12. If one attempts to remove the male piece from the female piece, the portion of the male piece forming the groove contacts the staple legs, thus preventing the male piece from being removed from the female piece, until the staple is removed from the connection.

More particularly, staples are shaped so that, when fitted, they are self retaining. The open ends 24 and 26 are wider than the portion of the staple that retains the fitting. The open ends are initially squeezed together so that the staple can be pushed into a connection. The open ends of the staple can then spring out, once the staple is fully inserted. This retains the staple within the hose connection.

But staples can fall out. This concern has led to additional methods of retention being requested. One method, as illustrated in FIG. 2, is to drill a hole in each of the staple legs, and then to place a wire 30 in each of the holes after assembly of the connection. This stops the staple 16 from falling out under its own weight. But it makes it difficult to later remove the staple from the hose connection. This wire staple retention method significantly increases costs and is time-consuming. It also increases the expenses associated with the operation of the hydraulic equipment.

SUMMARY

One object is to provide a pin retention clip that is easy to fit and remove.

Another object is to provide a pin retention clip that locks itself in position around both the fitting and the staple.

Another object is to provide a pin retention clip that, if assembled properly, holds the staple in place.

Another object is to provide a pin retention clip that is highly visible so it can be quickly seen that it is fitted in place.

Another object is to provide a written warning regarding safety hazards associated with hydraulic connections.

This disclosure provides a clip for a pin that extends from an outer surface of a member, the clip comprising a pin

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retaining portion and a clamp portion that surrounds the member outer surface, the clamp portion having a pin receiving opening therein adapted to receive the exposed end of the pin, and a pin retaining portion adjacent the pin receiving opening to retain the pin in the member.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-sectional view of a prior art staple type hydraulic connection.

FIG. 2 is a perspective view of a prior art staple type hydraulic connection with a wire retention mechanism.

FIG. 3 is a perspective view of a female sleeve piece, a U-shaped staple, and a first embodiment of a pin retention clip.

FIG. 4 is a perspective view of the bottom of the assembly shown in FIG. 3.

FIG. 5 is a perspective view of the pin retention clip shown in FIG. 3.

FIG. 6 is a perspective view of a second embodiment of the pin retention clip.

FIG. 7 is an exploded view of a hydraulic connection including a female sleeve piece, a male piece, a U-shaped staple, and a pin retention clamp.

FIG. 8 is a top perspective view of a third embodiment of the pin retention clip, with a written warning added to the clip.

FIG. 9 is a bottom perspective view of the third embodiment of the pin retention clip shown in FIG. 8.

FIG. 10 is a perspective view of the third embodiment of the pin retention clip on a hydraulic hose connection.

FIG. 11 is a top perspective view of a fourth embodiment of the pin retention clip.

FIG. 12 is a bottom perspective view of the fourth embodiment of the pin retention clip shown in FIG. 11.

FIG. 13 is a perspective view of the fourth embodiment of the pin retention clip on a hydraulic hose connection.

Before one embodiment of the disclosure is explained in detail, it is to be understood that the disclosure is not limited in its application to the details of the construction and the arrangements of components set forth in the following description or illustrated in the drawings. The disclosure is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. Use of "including" and "comprising" and variations thereof as used herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Use of "consisting of" and variations thereof as used herein is meant to encompass only the items listed thereafter and equivalents thereof. Further, it is to be understood that such terms as "forward", "rearward", "left", "right", "upward" and "downward", etc., are words of convenience and are not to be construed as limiting terms.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 3 through 7 illustrate a clip 100 for a connection between two members 104 and 108 (see FIG. 7). In the preferred embodiment, the members are hydraulic hoses, but in other embodiments, not shown, the clip 100 can be used with any two pieces requiring a connection. Still more particularly, the clip 100 can be used anywhere a pin needs to be retained in a bore in a member. In the illustrated embodiment, one member is a female sleeve piece 104, and the other

member is a male piece **108** of a size and configuration to permit insertion into the female sleeve piece **104**.

The male piece has a groove **112**, and, when the male piece is received within the female sleeve piece, the groove is aligned with two spaced apart openings **116** (only one is shown in FIG. 7) in the female sleeve piece **104**. The openings **116** receive the ends **120** of a pin **124** in the form of a U-shaped staple. The legs of the U-shaped staple are received within the groove of the male piece **108** and secured by the female sleeve piece **104**, thus locking the male piece **108** within the female piece **104**. The free ends **120** of the staple also extend through aligned openings **128** (only one is shown in FIG. 7) in the opposite side of the female sleeve piece **104**. If one attempts to remove the male piece from the female piece, the portion of the male piece forming the groove contacts the staple legs, thus preventing the male piece **108** from being removed from the female piece **104**.

More particularly, the staple **124** is shaped so that, when fitted, the staple is self-retaining. The open ends **120** are wider than the portion of the staple that retains the male piece **108**. The open ends **120** are initially squeezed together so that the staple **124** can be pushed into the openings **116** through the female sleeve piece. The open ends of the staple then spring out, once the staple is fully inserted. This retains the staple within the hose connection.

In other less preferred embodiments, not shown, the pin could be a cotter pin received within an opening that passes through a member, the pin preventing the sliding of a sleeve over the member, for example.

The illustrated clip **100** comprises a pin-retaining portion **140** and a clamp portion **144** that surrounds a female sleeve piece outer surface **184**. The clamp portion **144** includes at least a first end **154** and a second end **156**. In the preferred embodiment, the clamp portion **144** is an integral piece. In other less preferred embodiments, not shown, the clamp portion can be formed of separate pieces that lock together around the outer surface of the connection, as further explained below.

The clamp portion **144** is movable between a first closed position and a second open position, the clip clamp portion first and second ends being separable, first, so that they can be distanced sufficiently so that the clamp portion **144** can be placed over the member outer surface **184** and, second, so that the first and second ends can be placed in a less separated position after being placed over the member outer surface **184**. Thus the clamp portion **144** at least partially surrounds the member **104** and is held on the member **104**. In other words, the clip clamp portion **144** is movable between a first relaxed position and a second expanded position, said clip clamp portion being sufficiently flexible so that said clamp first and second ends can be first, be distanced sufficiently so that said clip clamp portion can be placed over said cable outer surface and second, so that said first and second ends return to a positively clamped position, either in the first relaxed position or between the first relaxed and second expanded positions.

As explained above, the clamp portion **144** is preferably formed from an integral plastic or metal piece. The plastic or metal piece is flexible so that the ends of the clamp portion can be pulled apart in order to have the clamp portion fit around the member **104**. In other less preferred embodiments, as explained above, the clamp portion can be made from separate pieces that lock together. In the alternative, some of the separate pieces could be hinged to one another.

The clamp portion **144** also has a pin-receiving opening **170** therein adapted to receive the exposed end **174** of the pin **124**, with the pin-retaining portion **140** being adjacent the pin

receiving opening **170** in order to retain the pin **124** in the member **104**. In the preferred embodiment, the staple-retaining portion **140** is a flexible arm attached to the clip clamp portion **144**. The flexible arm **140** is adapted to engage the closed end **174** of the staple **124**. More particularly, the arm is semi circular, and the clip clamp portion **144** is semi circular, in order to have the clip **100** snugly fit around the cylindrical member **104**. In other embodiments, as shown in FIG. 6, the clip clamp portion **244** can be rectangular in shape, in order to fit around a rectangular member, not shown.

Because staple connections come in a range of different sizes, the staple retaining clips have a similar number of sizes to match.

Although, in the preferred embodiment, the pin-retaining portion **140** is a flexible arm, in other embodiments, as shown in FIGS. 8, 9 and 10, the pin-receiving opening in the clamp portion can be an indentation **300** in the clip. In such an embodiment, the walls of the indentation **300** serve as the pin-retaining portion to retain the pin within the connection. In yet another embodiment, as shown in FIGS. 11, 12 and 13, the pin-receiving opening **320** can be in a flexible arm **330** that wraps around the top of a pin **340**.

In the preferred embodiment, the clip **100** is a brightly colored plastic, such as florescent orange, red, green or yellow. This makes it easier for one to verify that the clip is in place around a hose. Further, in the preferred embodiment, the first and the second ends **154** and **156** of the clamp portion **144** each has an opening **180** that receives an end of the U-shaped staple **124**. This serves to further secure the clip **100** around the U-shaped staple, thus preventing the clip from sliding away from the staple **124**. And in some embodiments, the clip can further include thereon text to be read by someone who sees the clip, as shown in FIG. 8.

Thus the staple **124** and clip **144** interact when a) part **174** of the staple protrudes through slot **170** or groove **300** of the clip and b) staple ends **120** pass through grooves in clip **100** or socket **350** to form a self retaining engagement.

The disclosed connection is made as follows. As illustrated in FIG. 7, the male piece **108** is inserted into the female sleeve piece **104**. The free ends of the U-shaped staple **124** are then inserted into the openings **116** in the top of the female sleeve piece **104**. The staple then continues being inserted until it passes through the groove **112** in the male piece **108**, and then out of the opposite holes **128** in the female sleeve piece **104**. The pin retention clip **100** is then placed around the connection, as follows. The free ends of the pin retention clip **100** are spread apart so that the pin retention clip **100** can pass over the connection. After the pin retention clip passes over the female sleeve piece **104**, the clip free ends are then allowed to return to their original position, placing the openings or slots **180** around the free ends of the staple **124**. Thus, the clip **100** is retained around the connection. The head **174** of the staple is received in the opening **170** in the top of the clip **124**, and abuts the pin retention portion **140** of the clip **100**. The pin retention portion of the clip thus holds the staple within the connection.

Various other features and advantages of the disclosure will be apparent from the following claims.

The invention claimed is:

1. A resilient clip for retaining a pin that connects members, the pin including two pin legs and a head portion connecting the pin legs, the clip comprising:
 - a first clip leg defining a first end portion, the first end portion including a first socket formed therein for receiving one of the pin legs;

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a second clip leg defining a second end portion, the second end portion including a second socket formed therein for receiving the other of the pin legs; and

a pin-retaining portion extending between the first and the second clip legs, the pin-retaining portion being recessed relative to adjacent retaining walls and defining a channel for receiving the head portion when the clip is secured around the pin,

wherein the first and second clip legs are connected to each other solely by the pin-retaining portion,

wherein the first end portion and the second end portion each include an opposing pair of socket walls that define the respective first and second sockets, and

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wherein the socket walls extend substantially parallel to the retaining walls.

2. The clip of claim 1, wherein the first and second sockets are substantially aligned with the channel.

3. The clip of claim 1, wherein the retaining walls and the socket walls have substantially the same thickness.

4. The clip of claim 1, wherein the first clip leg includes a first curved portion positioned between the pin-retaining portion and the first socket, and wherein the second clip leg includes a second curved portion positioned between the pin-retaining portion and the second socket.

5. The clip of claim 1, wherein at least a portion of the pin-retaining portion is semi-circular.

* * * * *